SELECTED TOPICS
In Aerospace Engineering

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TABLE OF CONTENT

CHAPTER SIXTEEN

FORMULATION OF KERNEL FUNCTION FOR AERODYNAMIC LOADING ON AIR VEHICLE

CHAPTER SEVENTEEN

UNSTEADY AERODYNAMIC THEORY OF LIFTING SURFACE

CHAPTER EIGHTEEN

NUMERICAL EVALUATIONS OF HYPERGEOMETRIC CYLINDRICAL FUNCTIONS

CHAPTER TWENTY THREE

ALTERNATE APPROXIMATE FUNCTION FOR KERNEL FUNCTION OF PLANAR OSCILLATING LIFTING SURFACES

CHAPTER TWENTY FOUR

APPROXIMATE FUNCTION FOR NEAR-FIELD KERNEL FUNCTION OF NON-PLANAR LIFTING SURFACES

CHAPTER TWENTY FIVE

APPROXIMATE FUNCTION FOR FAR-FIELD KERNEL FUNCTION OF OSCILLATING NON-PLANAR LIFTING SURFACES

CHAPTER TWENTY THREE

ALTERNATE APPROXIMATE FUNCTION FOR KERNEL FUNCTION OF PLANAR OSCILLATING LIFTING SURFACES

23.1. Introduction

This chapter describes alternate procedure to evaluate incomplete cylindrical function occurring in the formulation of unsteady aerodynamic of multiple interfering lifting surfaces. The present numerical approach can be considered to be a complementary procedure to the analytical expansion series developed in the previous chapters. While the analytical expansion series is appropriate for a small argument of the incomplete cylindrical function, the present approach is suitable for evaluating such function with a moderate to large value of its argument.

23.2. Epstein's Approach

Epstein et al [12] presents a numerical approach for evaluating the incomplete cylindrical function $\boldsymbol{B_1}$ as follows

$$r^2 B_1 = \int_{-|X'/r|}^{\infty} \cos(kru) F(u) du + i \int_{-|X'/r|}^{\infty} \sin(kru) F(u) du \tag{23.1}$$

where the function $F(u)$ is defined as

$$F(u) = \frac{1}{(1+u^2)^{3/2}} \tag{23.2}$$